

CS3402: DATABASE SYSTEMS

Effective Term

Semester A 2025/26

Part I Course Overview

Course Title

Database Systems

Subject Code

CS - Computer Science

Course Number

3402

Academic Unit

Computer Science (CS)

College/School

College of Computing (CC)

Course Duration

One Semester

Credit Units

3

Level

B1, B2, B3, B4 - Bachelor's Degree

Medium of Instruction

English

Medium of Assessment

English

Prerequisites

CS1315 Introduction to Computer Programming or
CS2310 Computer Programming or
CS2311 Computer Programming or
CS2313 Computer Programming or
CS2315 Computer Programming or
CS2360 Java Programming or equivalent

Precursors

Nil

Equivalent Courses

Nil

Exclusive Courses

Nil

Part II Course Details

Abstract

This course is aimed at equipping students with the knowledge of database design, as well as, the ability to use database management systems in an effective manner. The course will also provide an insight into database management techniques and concepts, namely, indexing, query optimization, transactions, concurrency control, and database recovery.

Course Intended Learning Outcomes (CILOs)

CILOs		Weighting (if app.)	DEC-A1	DEC-A2	DEC-A3
1	Design a database schema using the entity-relationship and relational data models.			x	
2	Improve an existing database schema through the normalization process.		x		
3	Apply SQL as a Data Definition Language (DDL) and a Data Manipulation Language (DML) effectively.		x		
4	Demonstrate good understanding of database management techniques and concepts.			x	

A1: Attitude

Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.

A2: Ability

Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.

A3: Accomplishments

Demonstrate accomplishment of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

Learning and Teaching Activities (LTAs)

LTAs		Brief Description	CILO No.	Hours/week (if applicable)
1	Lecture	Students will engage in learning concepts and techniques about database design, normalization, querying, storage, and management.	1, 2, 3, 4	3 hours/week

2	Tutorial	Students will work on hands-on exercises and in the laboratory to practice the database knowledge they have learned from lectures. They will engage in creating databases, performing queries, and managing databases using an actual database management system (e.g., Oracle).	1, 2, 3, 4	8 hours/semester
3	Assignment	Students will solve theoretical and practical problems related to the lectures and tutorials. They will also have the opportunity to use their database knowledge to solve real-world data management problems through assignment questions.	1, 2, 3, 4	3 times/semester

Assessment Tasks / Activities (ATs)

ATs		CILO No.	Weighting (%)	Remarks ("-" for nil entry)	Allow Use of GenAI?
1	3 Assignments (1 assignment every 4 weeks)	1, 2, 3, 4	15	Need to acknowledge	Yes
2	Midterm Examination	1, 2, 3	25	-	No

Continuous Assessment (%)

40

Examination (%)

60

Examination Duration (Hours)

2

Minimum Examination Passing Requirement (%)

30

Additional Information for ATs

For a student to pass the course, at least 30% of the maximum mark for the examination must be obtained.

Assessment Rubrics (AR)**Assessment Task**

Assignments

Criterion

1.1 Ability to design a database using a data modeling principles covered in the course

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Inadequate

Assessment Task

Assignments

Criterion

1.2 Ability to translate express a database design in SQL

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Inadequate

Assessment Task

Assignments

Criterion

1.3 Ability to use a database management system to store and manipulate data

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Inadequate

Assessment Task

Midterm Exam

Criterion

2.1, 3.1 Ability to demonstrate a good understanding of basic and advanced materials covered in the course

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Inadequate

Assessment Task

Final Exam

Criterion

2.1, 3.1 Ability to demonstrate a good understanding of basic and advanced materials covered in the course

Excellent (A+, A, A-)

High

Good (B+, B, B-)

Significant

Fair (C+, C, C-)

Moderate

Marginal (D)

Basic

Failure (F)

Inadequate

Part III Other Information

Keyword Syllabus

Database design methodology: entity-relationship model, functional dependency, normalization, data definition language. Query Language: SQL, relational algebra, query by example. Data model: relational model. Database management issues: integrity, trigger, user constraint, security. Transaction management: ACID properties, concurrency control, serializability, locking protocols, deadlock.

Syllabus

- Introduction
Database history. File-based system vs database. Database components. Architecture. Data independence. Data models.
- File organization
Physical data organization: Ordered file. Indexed file. Hash file.
- Data model and query
Relational model: schema, primary key, foreign key, algebra, database operators. Data definition. SQL.
- Database design
Entity Relationship model. Data redundancy. Functional dependency. Normalization: BCNF, 3NF.
- Transaction management
Concurrency Control: ACID Properties, Serializability, Locking Protocols, deadlock detection and prevention.

Reading List

Compulsory Readings

Title	
1	Elmasri R. and Navathe S. B. (2010) Fundamentals of Database Systems. Addison Wesley, 6th edition.

Additional Readings

Title	
1	Silberschatz A., Korth H. and Sudarshan S. (2010) Database System Concepts. McGraw-Hill Companies Inc., 6th edition.